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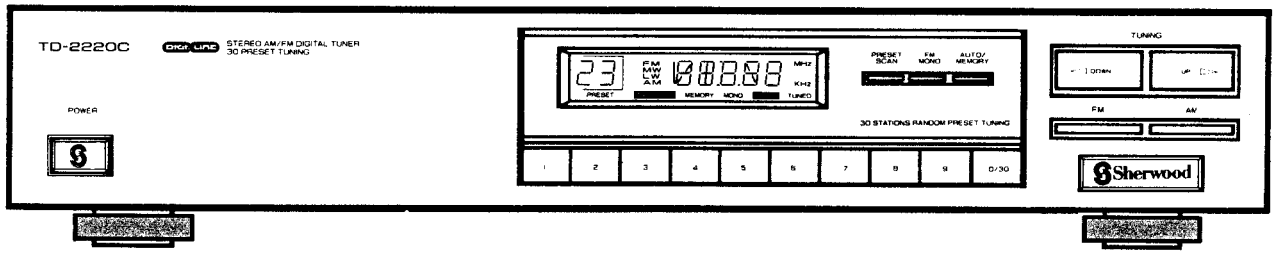
SERVICE MANUAL

TD 2220C

AM/FM
STEREO DIGITAL TUNER



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Separate Sheet (II)

Sherwood

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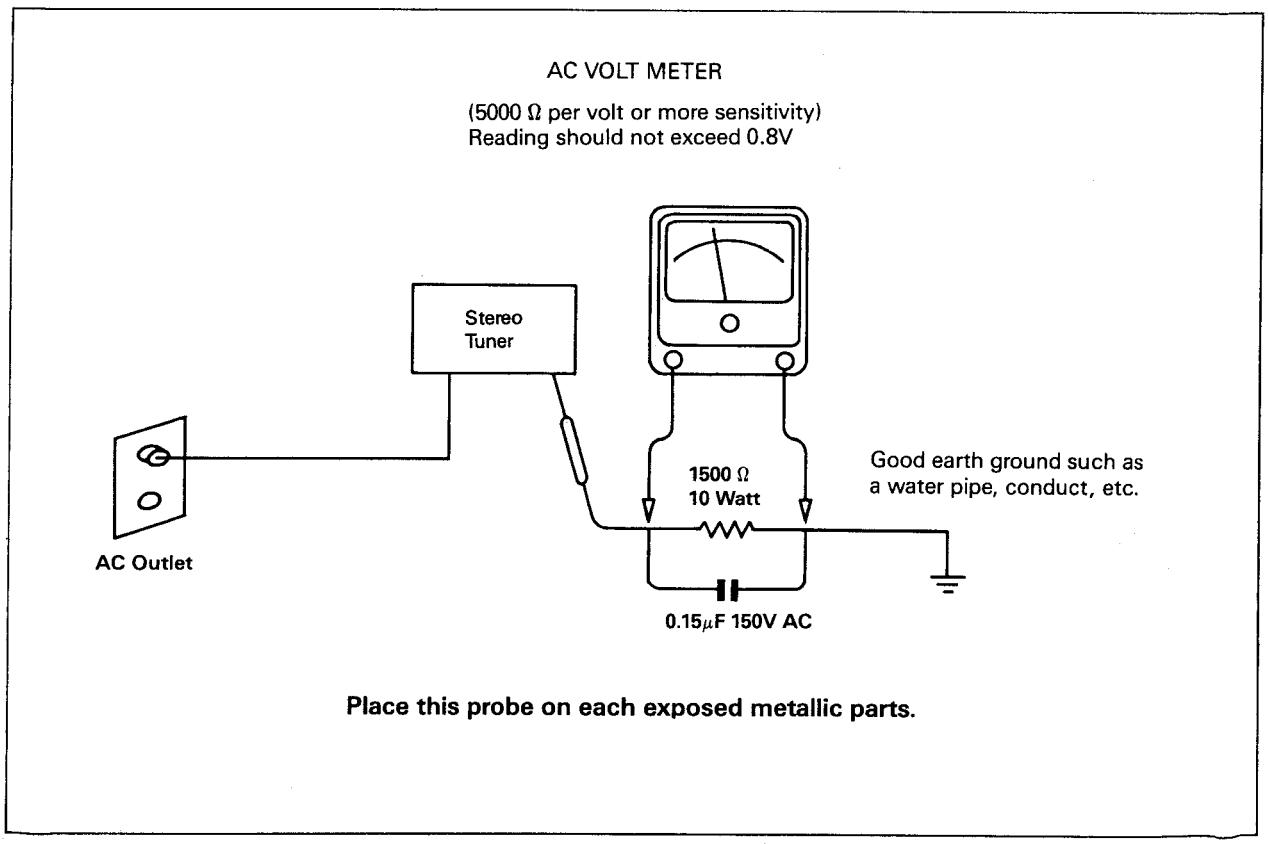
Safety Precaution

WARNING

Service should not be attempted by anyone unfamiliar with the necessary precautions on this player. The following precautions are necessary during servicing.

1. Many electrical and mechanical parts in this player have special characteristics often pass unnoticed and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristic are identified in this manual and its supplements: electrical components having such features are identified by a ⚠ in the schematic diagram and the parts list.
   Before replacing any of these components, read the parts list in this manual carefully.
   The use of substitute replacement parts that do not have the **same** safety characteristics as specified in the parts list may create shock, fire or other hazards.
2. Before returning the set to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as terminals, screwheads, metal overlays, etc. to be sure the set is safe to operate without danger of electrical shock. Plug the AC line cord directly into a 120V AC outlet **(120V Version only).** (Do not use a line isolation transformer during this check.) Use an AC voltmeter having 5000 Ω per volt or more sensitivity in the following manner:
   Connect a 1500 Ω 10 watt resistor paralleled by a 0.15μF, 150V AC capacitor, between a known good earth ground (water pipe, conduct, etc) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 Ω resistor and 0.15μF capacitor. Reverse the AC plug at the AC outlet and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed 0.3volts RMS. This corresponds to 0.2mA AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.


AC VOLT METER
(5000 Ω per volt or more sensitivity)
Reading should not exceed 0.8V
Stereo Tuner
1500 Ω
10 Watt
Good earth ground such as a water pipe, conduct, etc.
AC Outlet
0.15μF 150V AC

Place this probe on each exposed metallic parts.

Specifications

FM Section

Tuning Range
- Scanning Frequency Interval(Auto/Manual);
  - USA/Canada version 87.50-107.90MHz/200kHz
  - Europe/Australia version 87.50-108.00MHz/50kHz

Usable Sensitivity
- IHF at S+N+D/N+D=30dB
  - 75 ohm (75kHz dev.) 2μV (11.2dBf)
- DIN at S+N/N=26dB
  - 75 ohm (40kHz dev.) 1.7μV (9.8dBf)

Quieting Sensitivity at 98MHz
- IHF at 75kHz dev. Mono 7μV (22.1dBf)
  - Stereo 70μV (42.1dBf)
- DIN at 40kHz dev. Mono 5μV (19.2dBf)
  - Stereo 55μV (39.2dBf)

THD at 1kHz;
- IHF at 75kHz mod. Mono 0.2%
- (40kHz for DIN) Stereo 0.4%

Stereo Separation at 1kHz 45dB

Signal to Noise ratio
- IHF at 75 kHz mod. Mono 75dB
  - Stereo 68dB

Frequency Response 20Hz-15kHz ..... +0.5/−1dB

Audio Output voltage at 1kHz, 100% mod. ..... 600mV ± 150mV

De-emphasis;
- USA/Canada version 75μsec
- Europe/Australia version 50μsec

Capture Ratio 2dB

Alternate channel selectivity 60dB

Image Rejection 70dB

IF Rejection 65dB

AM Rejection 50dB

Muting Level 10μV

AM (MW/LW) Section

Tuning Range;
- MW USA/Canada version 520-1710kHz
  - Australia/Europe version 522-1611kHz
- LW Europe version 153-279KHz

Scanning Frequency Interval (Auto/Manual)
- USA/Canada version 10kHz
- Australia/Europe version 9kHz

Usable Sensitivity IHF
at 20dB S/N Loop Antenna
- MW 800μV/m
- LW 1000μV/m

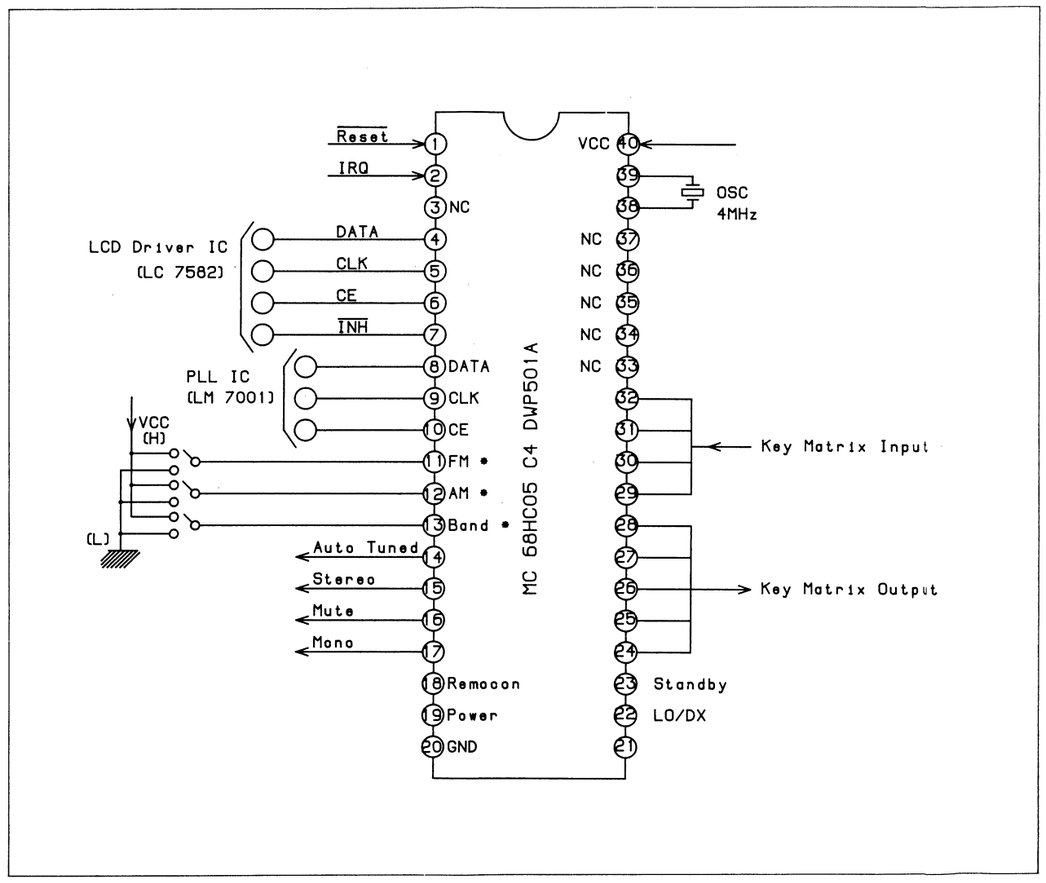
Signal to Noise ratio 30% mod. ref.
- MW 45dB
- LW 40dB

Audio Output voltage at 400Hz 30% mod. 150mV
Power Consumption 12W
Power Requirement;
A: 120V 60Hz for USA & Canadian version
B: 120/220V 60/50Hz for multi-voltage version
C: 220V 50Hz for general European version
D: 220V 50Hz for German & Italian version
E: 240V 50Hz for British & Australian version
F: 220V 50Hz for Swiss & Scandinabian version
Dimensions. . . . . 440(W)×70(H)×225(D) mm
17.3(W)×2.8(H)×8.9(D)inch
Weight(net) . . . . . 3kg (6 lbs, 9.6oz)

Note: Specifications and design subject to change without notice for improvements. Component and circutry are subject to modification to insure best operation under differing local conditions. This manual is based on the American (A) standard, and provides information on regional circuit modification through use of aletrnate schematic diagrams, and information on regional component variations through useof parts list.

Circuit Description

Pin Assignment

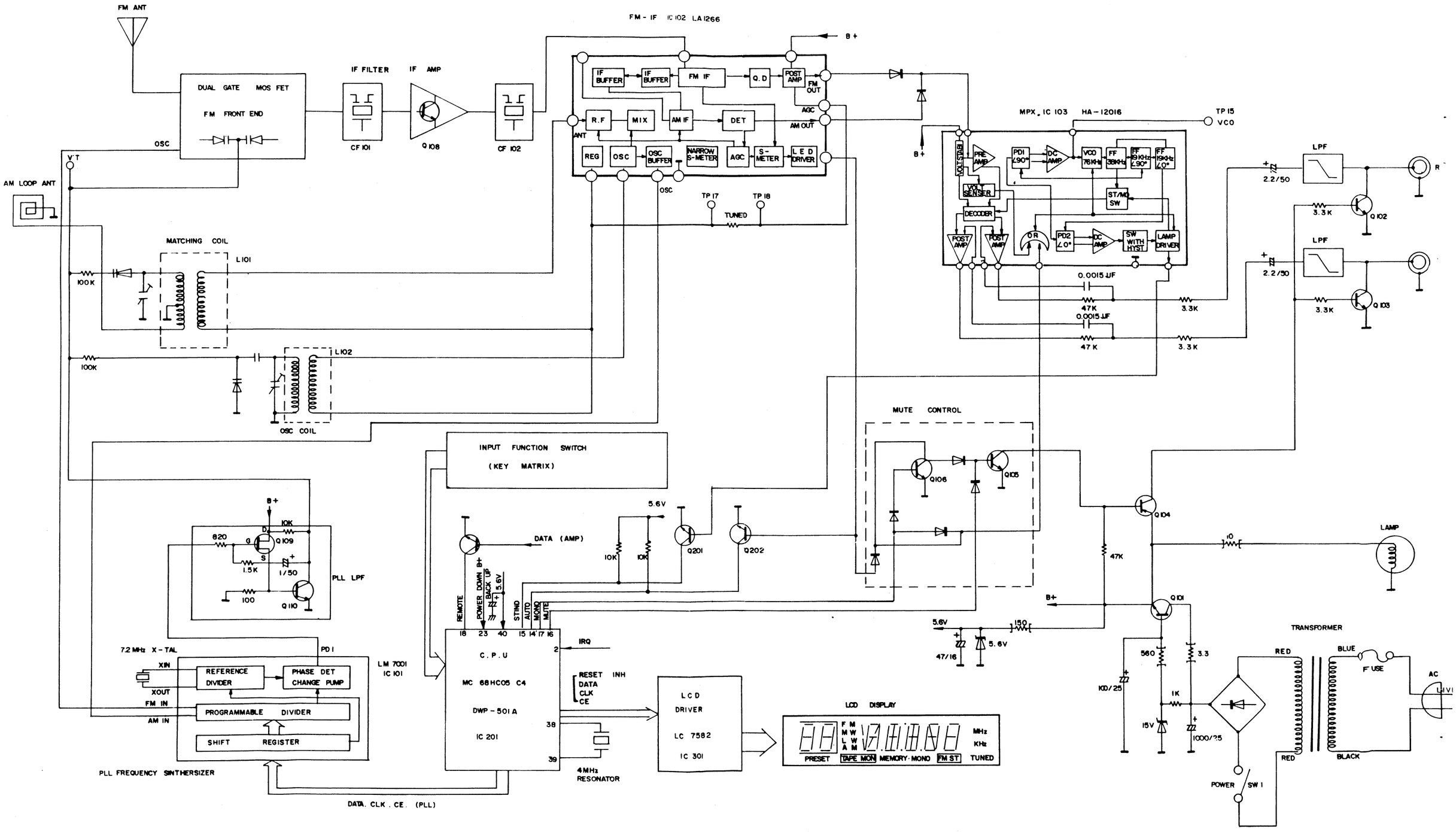


• **Band & Step adj.**

Pin	11	12	13
USA	H	H	L
Europe 2 (3)	L	L	L [H]
Domestic	H	L	L

Note: H: High level
L: Low level
11. H: 3 Band, L: 2 Band
12. H: 10kHz, L: 9kHz
13. H: 200kHz, L: 50kHz

Block Diagram

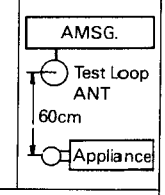


Alignment Procedures

* Before making adjustment, operate the appliance for more than 2 minutes.
* Note: 1. 0 dB=1μV 2. FM 100% Mod.=75kHz Dev. 3. DVM=Digital Volt Meter
4. SG=Signal Generator 5. SSG=Stereo Signal Generator

1. MW Adjustment

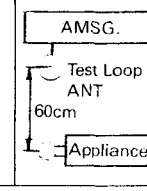
- Selector SW. _____ Tuner, MW/AM
- In case of 2 band appliance (AM/FM), MW is converted into AM.

No.	Subject	Feed Signal From	Feed Signal To	Setting Appliance	Measure Output	Adjust Point	Adjust For	Remark
1.	Tuning Voltage	520kHz		*1) 520kHz	Connect DVM to TP18	L102	DC 1.2±0.4V	
		1710kHz		*2) 1710kHz		TC102	DC 8.4±0.4V	
		• Repeat the step *1) and *2) until DVM reads the tuning voltage mentioned above. • In case the freq. is 9kHz, the freq. of AM SG and appliance should be changed to *1) 522kHz *2) 1611kHz						
2.	IF	AM IF Genescope	ANT.		Connect IF Genescope	L103	Symmetrical curve on AM IF Genescope	
3.	RF Tuning	*1) AM SG 600kHz, 74dB 400Hz (30% mod.)	ANT.	600kHz	Output Connect AC Voltmeter & Oscilloscope	L101	Maximize audio output	
		*2) AM SG 1400kHz, 74dB 400Hz (30% mod.)	ANT.	1400kHz		TC101		
		• Feed Signal should be fed to Loop ant. through the TEST Loop ant., 60cm distant from the appliance • Repeat the steop *1) and *2) until no further improvement occurs. • In case the freq. is 9kHz, the freq. of AM SG and appliance should be changed to *1) 603kHz and *2) 1404kHz.						
4.	Tuned Level	AM SG 1000kHz, 80dB 400Hz (30% mod.)	ANT.	1000kHz	Output Connect Oscilloscope	VR104	TUNED Light on	in LCD
		• In case the freq. steop is 9kHz, the freq. of AM SG and appliance should be changed to 999kHz.						

2. LW Adjustment

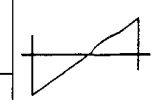
- Selector SW. _____ Tuner, AM
- This adjustment is nesessary to 3 band (MW/LW/FM).

No.	Subject	Feed Signal From	Feed Signal To	Setting Appliance	Measure Output	Adjust Point	Adjust For	Remark
1.	Tuning Voltage	153kHz	279kHz	*1) 153kHz	Connect DVM to TP18	LL102	DC 2±0.2V	
				*2) 279kHz		LTC102	DC 5.5±0.2V	
		• Repeat the step *1) and *2) until DVM reads the tuning voltage mentioned above.						

No.	Subject	Feed Signal		Setting Appliance	Measure Output	Adjust Point	Adjust For	Remark
		From	To					
2.	RF Tuning	*1) AM SG 162kHz, 80dB 400Hz (30% mod.)	ANT.	162kHz	Output Connect AC Voltmeter & Oscilloscope	LL101	Maximize audio output	
		*2) AM SG 252kHz, 80dB 400Hz (30% mod.)		252kHz		LTC101		
		• Feed Signal should be fed to Loop ant. through the Test Loop ant., 60cm distant from the appliance • Repeat the step *1) and *2) until no further improvement occurs.						

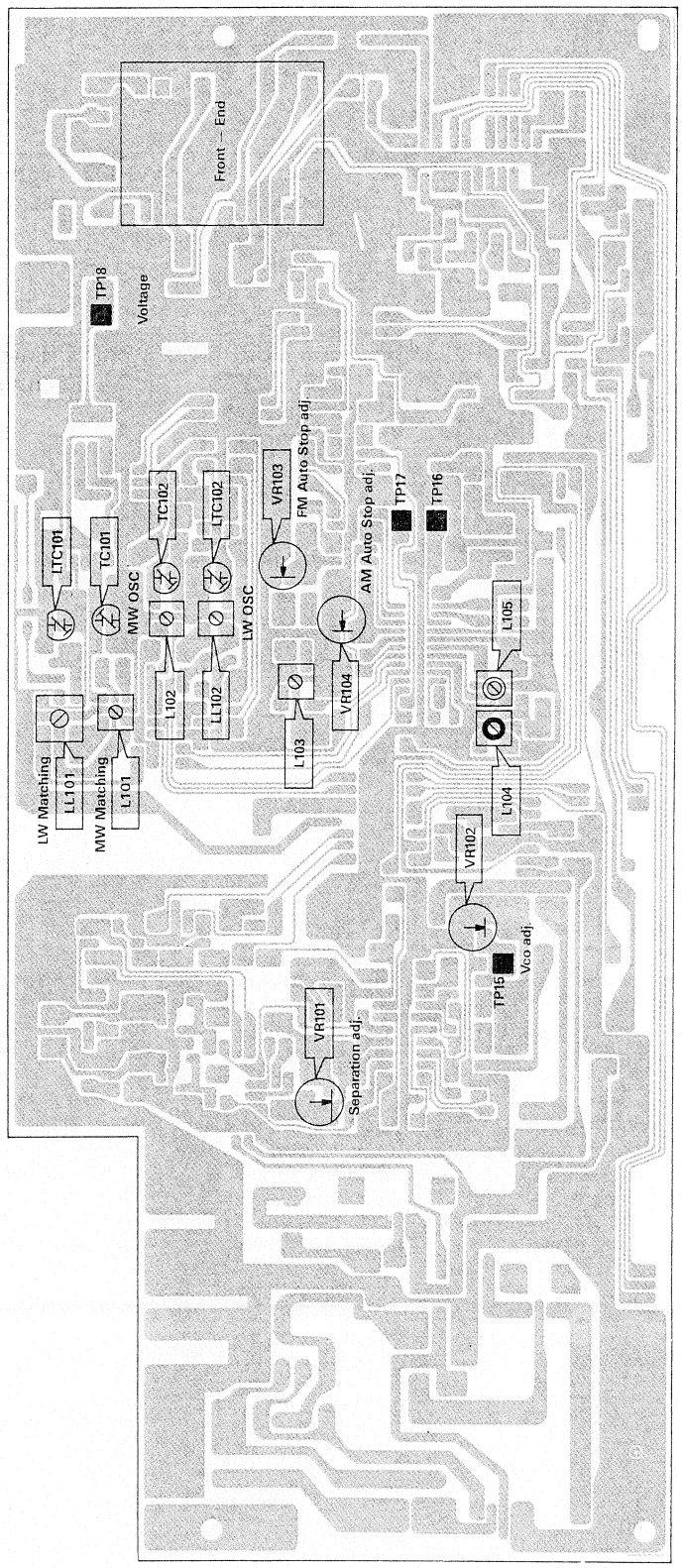
3. FM Adjustment

- Selector SW. _____ TUNER, FM (Mono/Stereo)
- Deviation _____ USA/Canada (75 kHz Dev.)
  Europe (40 kHz Dev.)

No.	Subject	Feed Signal		Setting Appliance	Measure Output	Adjust Point	Adjust For	Remark
		From	To					
1.	Turing Voltage			87.50 MHz	Connect DVM	TP18	DC 2.0 ± 0.2V	
				107.90 MHz			DC 8.8 ± 0.2V	
2.	IF	FM IF Genescope	ANT.	98.10MHz 60dB	TP16 & TP17 Connect IF Genescope	L105	Symmetrical S curve on FM IF Genescope	
					TP16 & TP17 Connect DVM		DC 0 ± 50mV	
				Detune	Connect Oscilloscope	L105	Maximize noise output	In case IF Genescope is not available
					TP16 and TP17 Connect DVM		DC 0 ± 50mV	
3.	THD (Mono)	FM SG 98.10MHz, 60dB 1kHz (75kHz dev.)	ANT.	98.10MHz Mono	*1) Output Connect DVM	L105	DC 0 ± 0.05V	TP 16 and TP17
					*2) Output Connect AC Voltmeter & Distortion Analyzer	L104	Minimize distortion	
		• Adjust the step *1) 1st and the step *2) next and repeat until no further improvement occurs.						
4.	MPX (VCO)	FM SSG 98.10MHz, 60dB 1kHz (75kHz dev.) Pilot 19kHz (9% mod.)	ANT.	98.10MHz Stereo	TP15 Connect freq. Counter	VR102	Read 76kHz	
		• Before adjustment, set the FM SSG to 'Mod. Off'.						

No.	Subject	Feed Signal		Setting Appliance	Measure Output	Adjust Point	Adjust For	Remark
		From	To					
5.	THD (Stereo)	FM SSG 98.10MHz, 60dB 1kHz (75kHz dev.) Pilot 19kHz (9% Mod.)	ANT.	98.10MHz Stereo	Output connect AC voltmeter & distortion	Front-End	Minimize distortion	
6.	Mute Level	FM SG 98.0 MHz, 10μV (5μ V for Europe) 1kHz (75kHz Dev.) (40kHz dev. for Europe)	ANT	98.10MHz Stereo	Output connect Oscilloscope	VR103	Muting occurs marginally	
7.	Separa-tion	*1) FM SSG 98.10MHz, 60dB 1kHz (75kHz, dev) Pilot 19kHz (9% mod) (Lch-> Rch)	ANT	98.10MHz Stereo	R ch Mod connect AC voltmeter & distortion analyzer and oscilloscope	VR101	Minimize output	L ch Mode
		*2) Same as above (Rch-> Lch			L ch Mod connect same as above		Minimize output	R ch Mode
		• Repeat the step *1)until no further improvement occurs.						

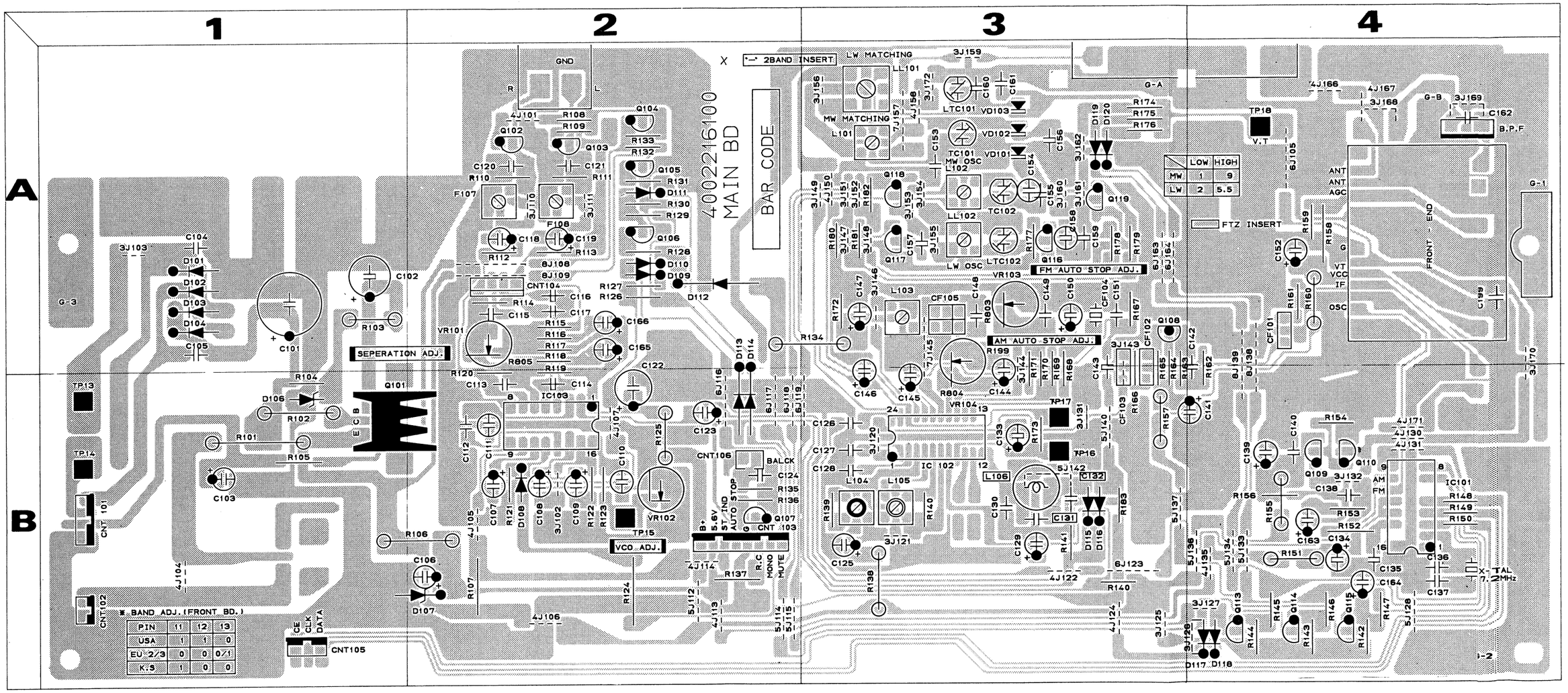
Alignment Point



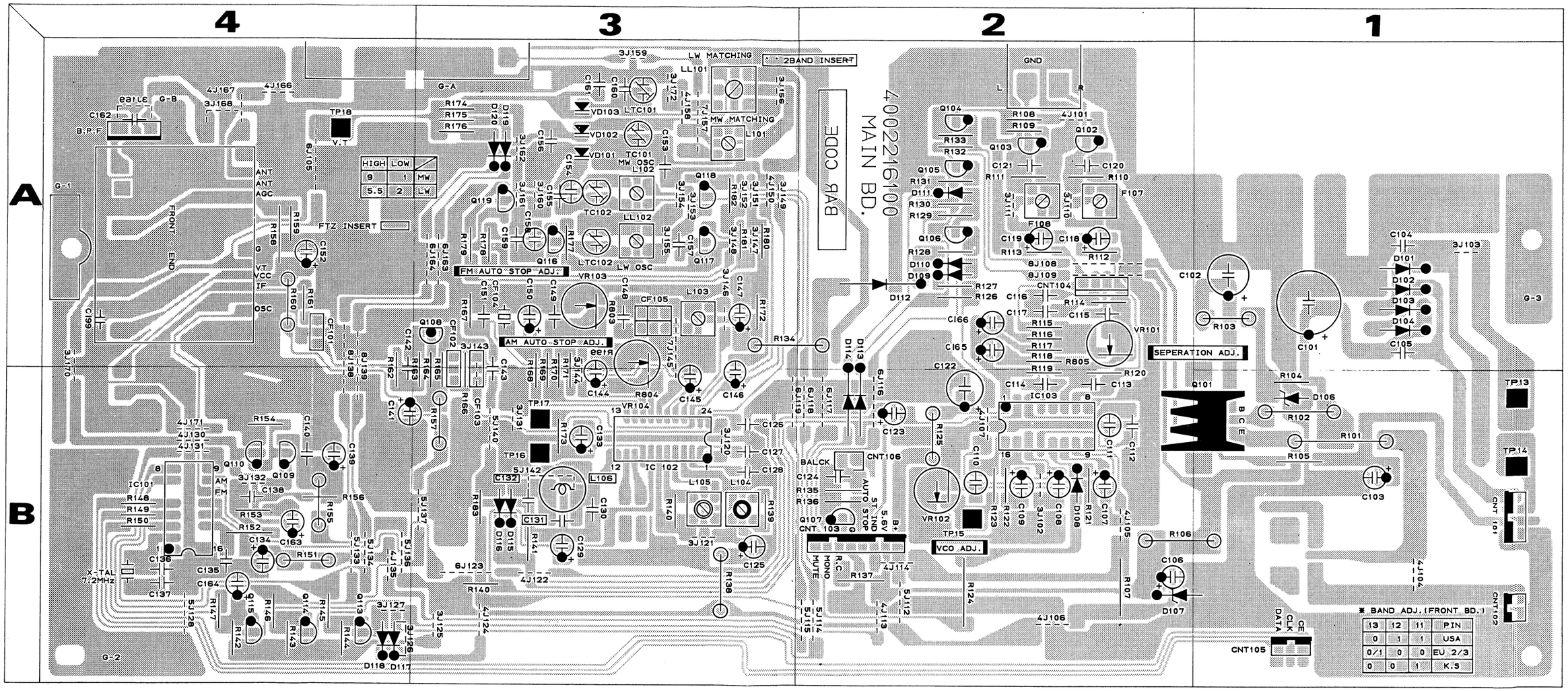
P.C Boards (Top & Bottom Views)

MAIN BOARD 4002216100

(TOP VIEW)



(BOTTOM VIEW)



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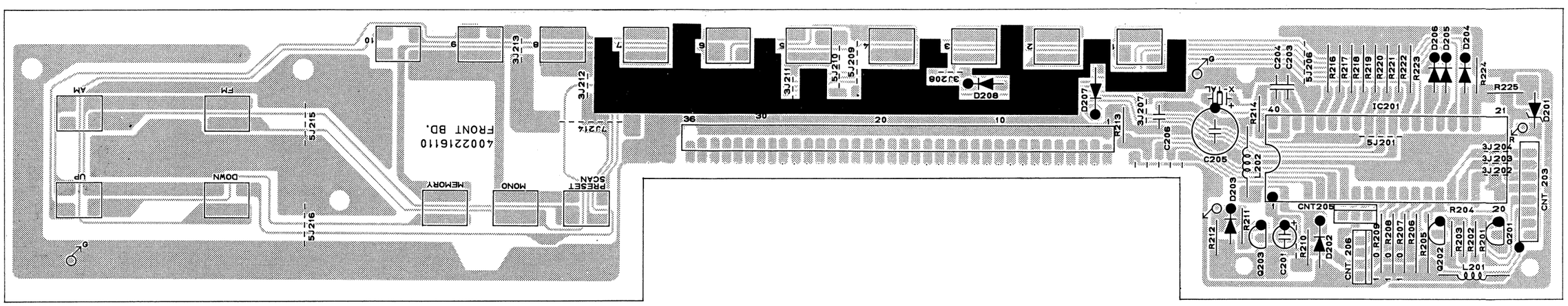
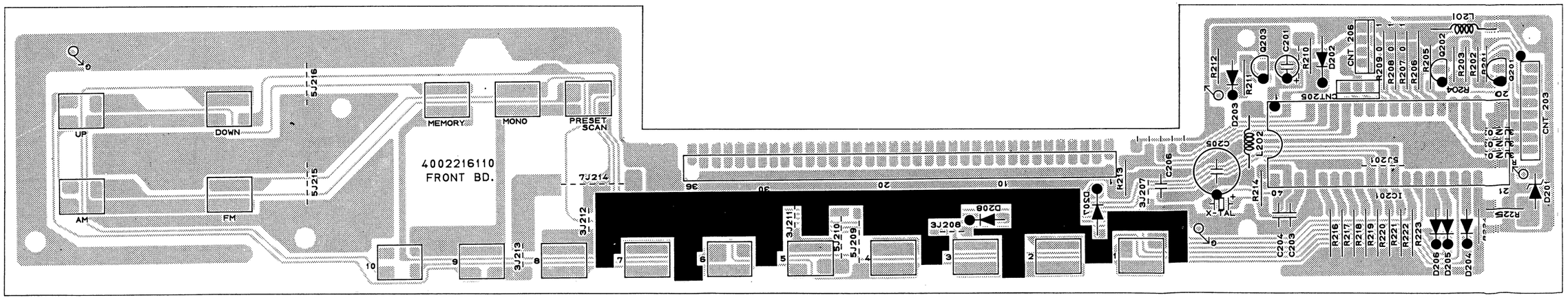
FRONT BOARD 4002216110

(TOP VIEW)

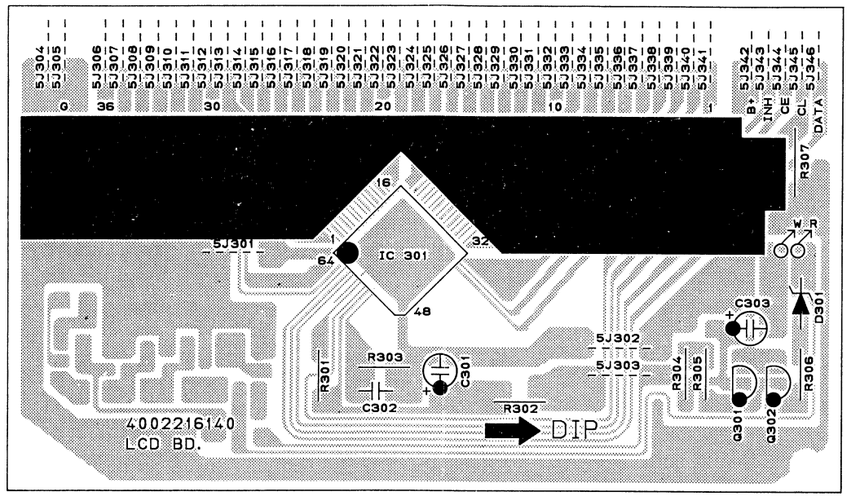


(BOTTOM VIEW)

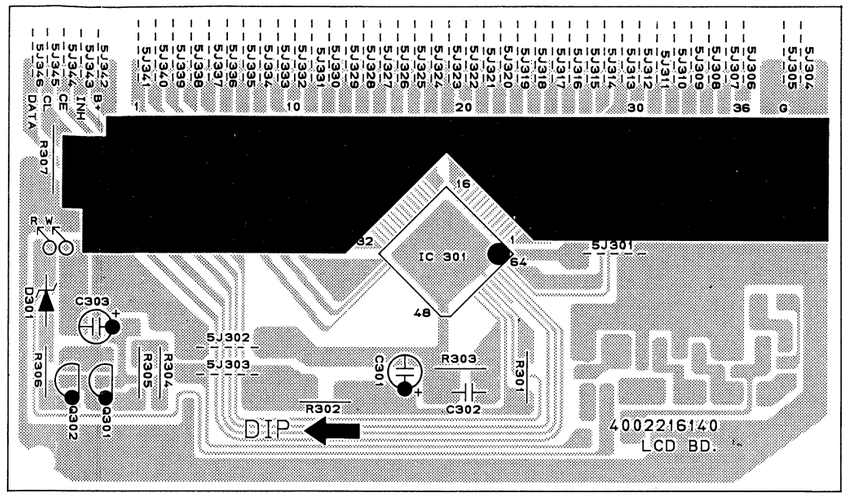


LCD BOARD 4002216140

(TOP VIEW)

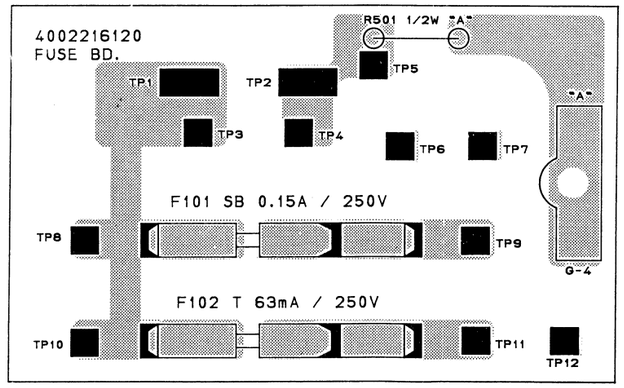


(B0TTOM VIEW)



FUSE BOARD 4002216120

(TOP VIEW)



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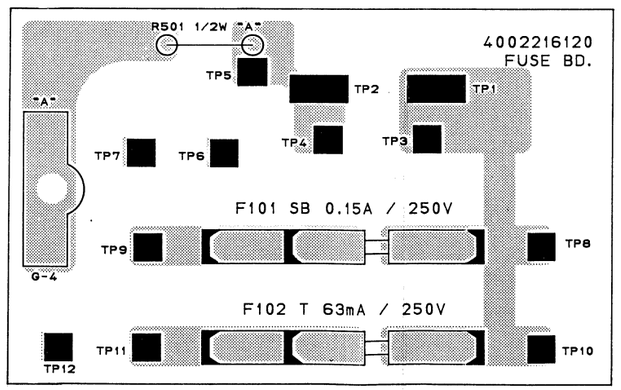
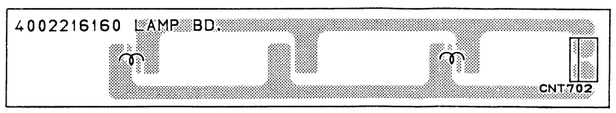


LAMP BOARD 4002216160

(TOP VIEW)



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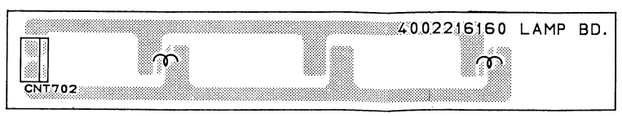
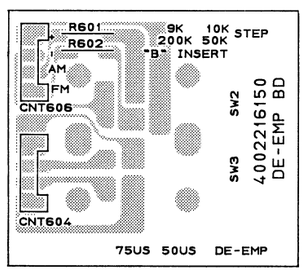


DE-EMPHASIS BOARD ('B' Version only) 4002216150

(TOP VIEW)



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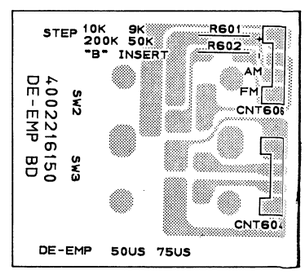
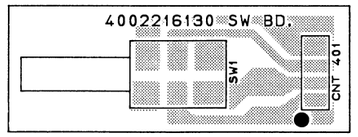


SW BOARD 4002216130

(TOP VIEW)



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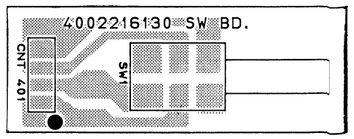
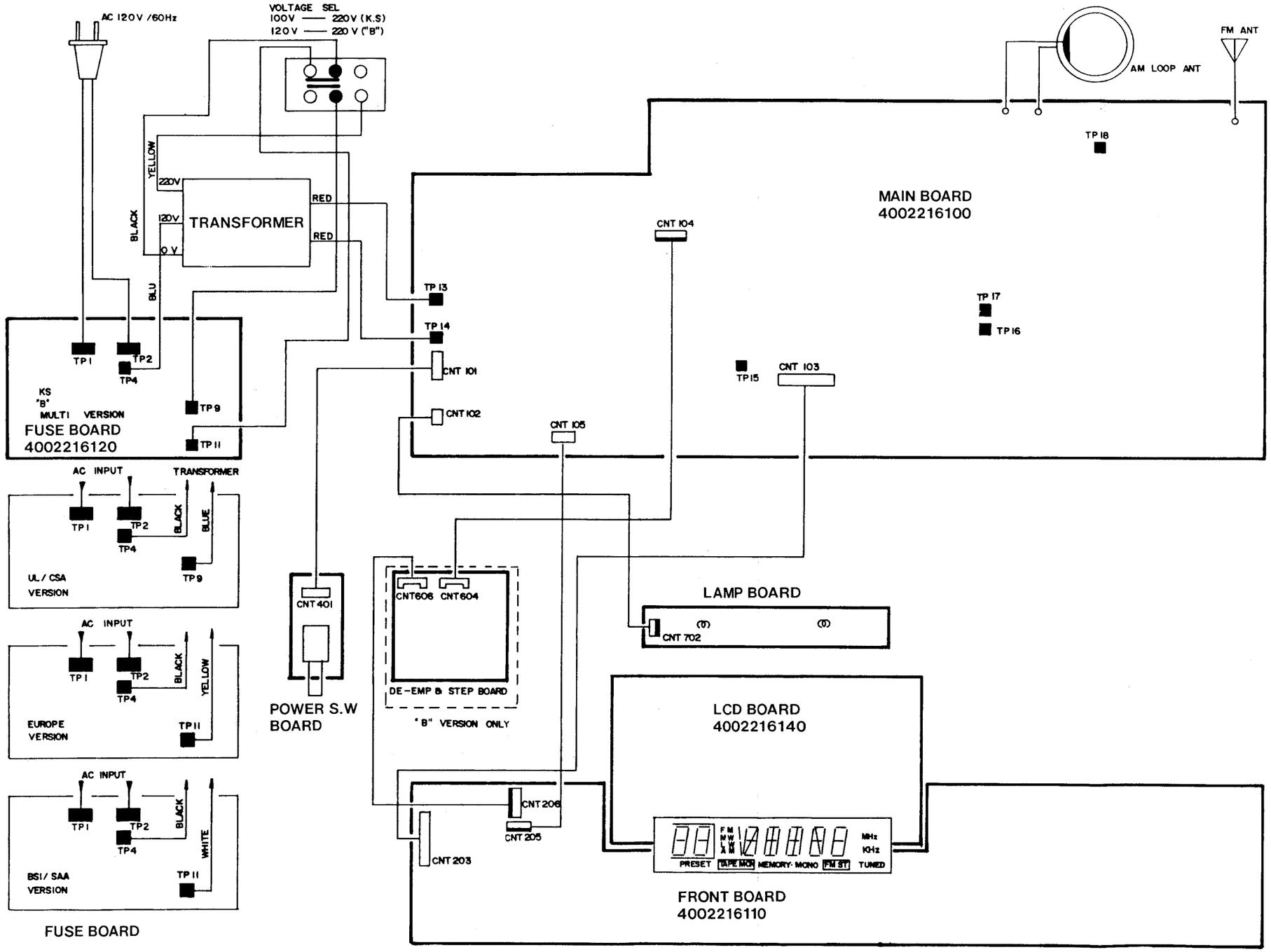
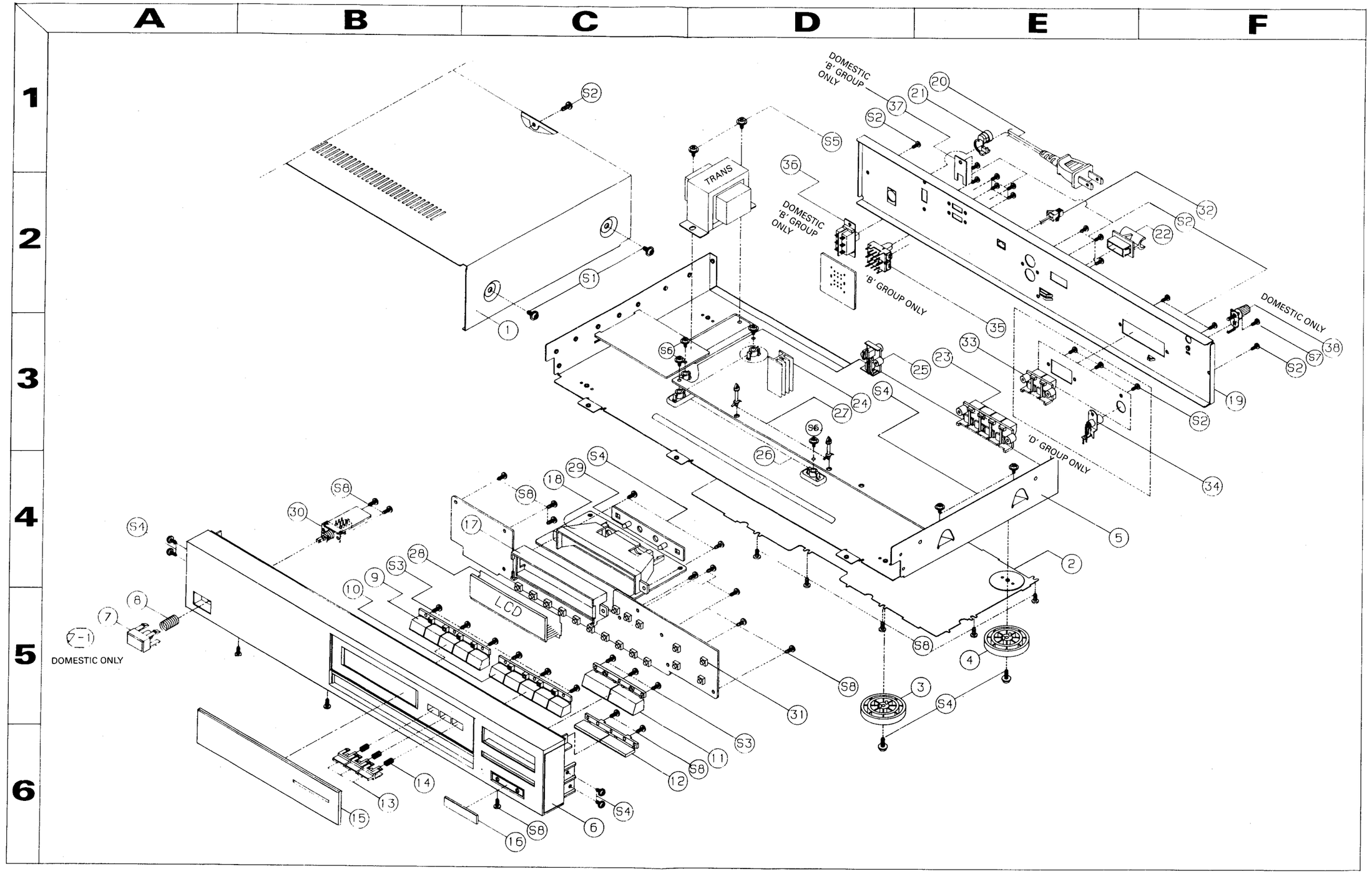


Wiring Diagram



Exploded View



Electrical Parts List

PRODUCT SAFETY NOTICE: Products marked with a ⚠ have special characteristics important to safety. If yoy replace any of these components, carefully read the product safety notice of this manual. Don't degraded the safety of the product through improper servicing. Resistors & Capacitors tolerance, D: ±0.5%, J: ±5%, K: ±10%, M: ±20%, Z: +80%, −20%.

Ref. No.	Part No.	Description	Position	Remark
Main P.C. Board 4002216100				
Capacitors				
C101	3409210249	Electric SA 1000μF 25V M	1A	
C102	3479210141	Electric SA 100μF 25V M	1A	
C103	3479210061	Electric SA 10μF 35V M	1B	
C104/C105	3679223120	Mylar 0.022μF 100V J	1A	
C106	3479247031	Electric SA 47μF 16V M	2B	
C107	3479233971	Electric SA 3.3μF 50V M	2B	
C108	3479210971	Electric SA 1μF 50V M	2B	
C109	3479233971	Electric SA 3.3μF 50V M	2B	
C110	3619102110	Poly 1000pF 50V J	2B	
C111	3619681110	Poly 680pF 50V J	2B	
C112	3679473120	Mylar 0.047μF 100V J	2B	
C113/C114	3679152120	Mylar 0.0015μF 100V J	2B	
(C113/C114)	(3679102120)	Mylar 0.001μF 100V J	2B	B,C,D,E,F
C115/C116	3579471130	Ceramic 470pF 50V J	2A	B
C117	3579151130	Ceramic 150pF 50V J	2A	
C118/C119	3479222971	Electric SA 2.2μF 50V M	2A	
C120/C121	3679392120	Mylar 0.0039μF 100V J	2A	
C122	3409222139	Electric SA 220μF 16V M	2B	
C123	3479222971	Electric SA 2.2μF 50V M	2B	
C124	3579102530	Ceramic 1000pF 50V Z	2B	
C125	3479210061	Electric SA 10μF 35V M	3B	
C126	3579103530	Ceramic 0.01μF 50V Z	3B	
C127/C128	3579473530	Ceramic 0.047μF 50V Z	3B	
C129	3479247971	Electric SA 4.7μF 50V M	3B	
C130	3579331130	Ceramic 330pF 50V J	3B	
C131	3579101130	Ceramic 100pF 50V J	3B	D
C132	3579820130	Ceramic 82pF 50V J	3B	A
C133	3479222971	Electric SA 2.2μF 50V M	3B	
(C133)	(3479210971)	Electric SA 1μF 50V M	3B	except D
C134	3479247031	Electric SA 47μF 16V M	4B	
C135	3579103530	Ceramic 0.01μF 50V J	4B	
C136/C137	3579270210	Ceramic CH 27pF 50V K	4B	
C138	3579223530	Ceramic 0.022μF 50V J	4B	
C139	3479247031	Electric SA 47μF 16V M	4B	
C140	3579103530	Ceramic 0.01μF 50V J	4B	
C141	3409210131	Electric SA 100μF 16V M	4B	
C142	3679223120	Mylar 0.02μF 100V J	3B	
C143	3679563120	Mylar 0.056μF 100V J	3B	
C144	3479210061	Electric SA 10μF 35V M	3B	
C145	3479247971	Electric SA 4.7μF 50V M	3B	
C146/C147	3479210061	Electric SA 10μF 35V M	3B/3A	
C148	3579470130	Ceramic 47pF 50V J	3A	
C149	3679473120	Mylar 0.047μF 100V J	3A	
C150	3479210061	Electric SA 10μF 35V M	3A	
C151	3679332120	Mylar 0.0033μF 100V J	3A	
C152	3409210131	Electric SA 100μF 16V M	4A	
C153	3579473530	Ceramic 0.047μF 50V Z	3A	
C154	3619471110	Poly 470pF 50V J	3A	
C155	3579680130	Ceramic 68pF 50V J	3A	
C156	3579473530	Ceramic 0.047μF 50V Z	3A	
C157	3579473530	Ceramic 0.047μF 50V Z	3A	D,F
C158	3619181110	Poly 180pF J	3A	D,F
C159	·	Not used !		
C160	3579220530	Ceramic 22pF 50V J	3A	D,F

Ref. No.	Part No.	Description	Position	Remark
C161	3579103530	Ceramic 0.01μF 50V J	3A	D,F
C162	·	Not used !		
C163	3479210970	Electric SA 1μF 50V M	4A	
C164	3479210971	Electric SA 0.1μF 50V M	4A	
C165	3479222041	Electric SA 22μF 25V M	2A	
C166	3479222041	Electric SA 22μF 25V M	2A	
Coils				
L101	2608201120	AM Matching	3A	
L102	2638201150	AM OSC	3A	
L103	2848001250	AM IFT	3A	
L104	2838501110	FM Quad Det A	3B	
L105	2838501210	Quad Det B FM TOK	3B	
L106	2648601430	Inductor 20.8mH	3B	D
LL101	2608201130	LW Matching	3A	D,F
LL102	2638401060	LW OSC	3A	D,F
Ceramic Flters				
CF101/102	3908011001	10.7 MA8K-A	4A/3B	A, Domestic
(CF101/102)	(3908011011)	10.7 MS3GH	4A/3B	B,C,D,E,F
CF103	·	Not used !		
CF104	3908001120	BFU450CN	3A	
CF105	3908001150	SFZ 450B	3A	
F107/F108	2658301100	MPX Filter 19kHz	2A	
Connectors				
CNT101	4428517710	Plug 4P	1B	
CNT102	4428517510	Plug 2P	1B	
CNT103	4428518110	Plug 8P	2B	
CNT104	4358504160	Ass'y 4P to De-emphasis Board	2A	B
CNT105	4428517610	Plug 3P	1B	
CNT106	4428511110	Plug 2P	2B	
·	4428511220	Remocon Ass'y 2P	2B	
Diodes				
D101-D104	2258106100	1N4002	1A	
D105 ⚠	·	Not used !		
D106 ⚠	2058599109	Zener DZ 15BH	1B	
D107	2058599103	Zener DZ 5.1BM	2B	
D108-D113	2058306101	1N4148	2B/2A	
D114/D115	2058306101	1N4148	2B/3B	
D116	2058306101	1N4148	3B	
D117/D118	2058306101	1N4148	4B	D,F
D119/D120	2058306101	1N4148	3A	D,F
VD101/102	2058819106	Varactor KV1236Z	3A	
(VD101/102)	(2058819105)	Varactor KV1235Z	3A	D,F
VD103	2058819105	Varactor KV1235Z	3A	D,F
ICs				
IC101	2168411105	HA 12016, MPX IC	2B	
IC102	2168017128	LA 1266, IF	3B	

Ref. No.	Part No.	Description	Position	Remark
IC103	2138017112	LM 7001, PLL	4B	
Trimmers				
TC101	3838001160	Trimmers 20pF	3A	
TC102	3838001150	Trimmers 10pF	3A	
LTC101	3838001160	Trimmers 20pF	3A	D,F
LTC102	3838001160	Trimmers 20pF	3A	D,F
Resistors: All resistors are 1/5W ±5% tolerance, unless otherwise specified. M is metal film, M.O is metal oxide and C is cement type.				
R101 ⚠	3039100572	M.O, 10Ω 2W	1B	
R102 ⚠	3039339472	M., 3.3Ω 1W	1B	
R103 ⚠	3009561273	M., 560Ω 1/4W	1A	
R104	3069102970	1kΩ	1B	
R105	3069223970	22kΩ	1B	
R106 ⚠	3039151472	M., 150Ω 1W	2B	
R107	3069103970	10kΩ	2B	
R108/R109	3069332970	3.3kΩ	2A	
R110/R111	3069332970	3.3kΩ	2A	
R112/R113	3069332970	3.3kΩ	2A	A,B,Domestic
(R112/R113)	(3069122970)	1.2kΩ	2A	C,D,E,F
R114	3069392970	3.9kΩ	2A	
R115	3069473970	47kΩ	2A	
R116	3069332970	3.3kΩ	2A	
R117	3069223970	22kΩ	2A	
R118	3069332970	3.3kΩ	2A	
R119	3069223970	22kΩ	2B	
R120	3069473970	47kΩ	2B	
R121	3069104970	100kΩ	2B	
R122	3069102970	1kΩ	2B	
R123	3069562970	5.6kΩ	2B	
R124	3069562970	5.6kΩ	2B	
R125 ⚠	3009220270	M., 22Ω 1/4W	2B	
R126/R127	3069562970	5.6kΩ	2A	
R128	3069472970	4.7kΩ	2A	
R129	3069103970	10kΩ	2A	
R130	3069473970	47kΩ	2A	
R131	3069332970	3.3kΩ	2A	
R132	3069103970	10kΩ	2A	
R133	3069473970	47kΩ	2A	
R134 ⚠	3009471273	M., 470Ω 1/4W	3A	
R135	3069103970	10kΩ	2B	
R136	3069473970	47kΩ	2B	
R137	3069103970	10kΩ	2B	
R138 ⚠	3009220273	22Ω	3B	
R139	3069332970	3.3kΩ	3B	
R140	3069103970	10kΩ	3B	
R141	3069104970	100kΩ	3B	
R142	3069473970	47kΩ	4B	
R143	3069473970	47kΩ	4B	
R144	3069473970	47kΩ	4B	D,F
R145	3069472970	4.7kΩ	4B	D,F
R146	3069472970	4.7kΩ	4B	
R147	3069472970	4.7kΩ	4B	
R148/R149	3069101970	100Ω	4B	
R150	3069101970	100Ω	4B	
R151 ⚠	3009560273	M., 56Ω 1/4W	4B	
R152	3069821970	820Ω	4B	
R153	3069152970	1.5kΩ	4B	
R154	3069101970	100Ω	4B	

Ref. No.	Part No.	Description	Position	Remark
R155	3069101970	100Ω	4B	
R156	3069103970	10kΩ	4B	
R157 ⚠	3009101273	M., 100Ω 1/4W	3B	
R158	3069104970	100kΩ	4A	
R159	3069473970	47kΩ	4A	
R160 ⚠	3009101273	M., 100Ω 1/4W	4A	
R161	3069181970	180Ω	4A	
R162	3069561970	560Ω	4B	
R163	3069471970	470Ω	3B	
R164	3069332970	3.3kΩ	3B	
R165	3069331970	330Ω	3B	
R166	3069101970	100Ω	3B	
R167	3069272970	2.7kΩ	3A	A,B,Domestic
(R167)	3069182970	1.8kΩ	3A	C,D,E,F
R168	3069820970	82Ω	3B	
R169	3069272970	2.7kΩ	3B	A,B,Domestic
(R169)	(3069332970)	3.3kΩ	3B	C,D,E,F
R170	3069243970	24kΩ	3B	
R171	3069103970	10kΩ	3B	
R172	3069223970	22kΩ	3A	
R173	3069183970	18kΩ	3B	A,Domestic
(R173)	(3069333970)	33kΩ	3B	B,C,D,E,F
R174/R175	3069104970	100kΩ	3A	
R176	3069104970	100kΩ	3A	D,F
R177	3069155970	1.5MΩ	3A	D,F
R178/R179	3069473970	47kΩ	3A	D,F
R180	3069104970	100kΩ	3A	D,F
R181	3069473970	47kΩ	3A	D,F
R182	3069103970	10kΩ	3A	D,F
R183-R198	·	Not used !		
R199	3069153970	15kΩ	3B	C,D,E,F
VR101	3248310420	Semi. Res. 100kΩ	2A	A,B,Domestic
(VR101)	(3248347420)	Semi. Res. 470kΩ	2A	C,D,E,F
VR102	3248333220	Semi. Res. 3.3kΩ	2B	
VR103	3248322320	Semi. Res. 22kΩ	3A	
VR104	3248322320	Semi. Res. 22kΩ	3A	
Transistors				
Q101 ⚠	2028406121	NPN KTD1406Y	1B	
Q102/Q103	2208606112	NPN KTD1302Y	2A	
Q104	2208206105	PNP KTA1015Y	2A	
Q105/Q106	2208606104	NPN KTC1815Y	2A	
Q107	2208606104	NPN KTC1815Y	2A	
Q108	2008409101	NPN LM9018F	3A	
Q109	2018211100	FET, N-CH 2SK168D	4B	
Q110	2208606108	NPN KTC2240BL	4B	
Q111/Q112	2208206105	NPN KTA1015Y	4B	
Q113	2208206105	NPN KTA1015Y	4B	D,F
Q114/Q115	2208606104	NPN KTC1815Y	3A	D,F
Q116/Q117	2208606104	NPN KTC1815Y	3A	D,F
Q118/Q119	2208606104	NPN KTC1815Y	3A	
Others				
Front-End	3928801770	F-3630	4A	
(Front-END)	(3928801890)	FE407-G60	4A	D only
ANT1	2608207350	AM Loop Ant		
X-FMR. ⚠	2828055607	Power Transformer, 120V 60Hz	A	
X-FMR. ⚠	2828056907	Power Transformer, 120/220V, 60/50Hz	B	
X-FMR. ⚠	2828056707	Power Transformer, 220V 50Hz	C,D,F	

Ref. No.	Part No.	Description	Position	Remark
X-FMR. ⚠	2828057007	Power Transformer, 240V 50Hz		E
X-FMR. ⚠	2828056807	Power Transformer, 100/220V 60Hz		Domestic
Front Board 4002216110				
Capacitors				
C201	3479210871	Electric SA 0.1μF 50V M		
C202		Not used !		
C203/C204	3529330210	Ceramic CH 33pF 50V K		
C205	3439147312	Electric SA 0.047μF 5.5V M		
X-TAL	3939101830	Resonator 4MHz		
L201/L202	2648601010	Inductor 2.2μH		
CNT203	4358508216	Ass'y 8P to Main Board		
CNT205	4358503160	Ass'y 3P to Main Board		
CNT206	4358504351	Ass'y 4P to Main Board		
Diodes				
D201 ⚠	2058599123	DZ 8.2BL, Zener		
D202-D208	2058306101	1N4148		
IC201	2138309131	IC,MC68HC05C4 DWP-501A		
Q201-Q203	2208606104	TR. NPN KTC1815Y		
Switch Board 4002216130				
CNT401	4358504180	Ass'y 4P to Main Board		
De-Emphasis Board 4002216150 ('B' version only)				
Connectors				
CNT604	4428519410	Plug 4P		
CNT606	4428519410	Plug 4P		
Resistors				
R601/R602	3069103970	10kΩ		
Fuse Board 4002216120				
Fuses ⚠				
F101	5508110931	SB, 0.15A/250V AC		A,Domestic
F102	5508300534	T 63mA/250V AC		C,D,E,F
(F101)	(5508211230)	NB 0.25A/250V AC		B
(F102)	(5508210930)	NB 0,15A/250V AC		
Resistors				
R501 ⚠	3009335373	M, 3.3MΩ 1/2W		
Lamp Board 4002216160				
Connector				
CNT702	4358502140	Ass'y 2P to Main Board		

Ref. No.	Part No.	Description	Position	Remark
LCD Board 4002216140				
Capacitors				
C301	3479210121	Electric 100μF 10V M		
C302	3579681230	Ceramic 680pF 50V K		
C303	3479247031	Electric 47μF 16V M		
Diodes				
D301	2058599123	Zener DZ8.2B		
LCD	2338170350	LCD 8118JNP1		
IC				
IC301	2168017131	IC, LC7582 LCD Driver		
Resistors				
R301	3069122970	1.2kΩ		
R302	3069101970	100Ω		
R303	3069473970	47kΩ		
R304/R305	3069103970	10kΩ		
R306	3069472970	4.7kΩ		
R307	3069473970	47kΩ		
Transistors				
Q301/Q302	2208606104	NPN KTC1815Y		

Mechanical Parts List

No.	Part No.	Description	Q'ty	Position	Remark
1	046122015911	Cover Top, Black	1	C3	
2	6123405410	Cover Bottom	1	E4	
3	046035101511	Foot with Rubber, Gold Front	2	D5	Domestic, A
	046035101511	Foot with Rubber, Gold	4	D5	B,C,D,E,F
4	6035101510	Foot with Rubber, Black Rear	2	E5	Domestic, A
	·	Not used !	0	·	B,C,D,E,F
5	6121602210	Chassis Main	1	E4	
6	048501014911	Panel Front, Black	1	C6	
7	048545048211	Button Power	1	A5	
7-1	8545048210	Button Power	1	A5	Domestic
8	6555004380	Spring Push, Power	1	A5	
9	048543014016	Knob Tact A-1	1	B4	
10	048543014017	Knob Tact A-2	1	B4	
11	048543014111	Knob Tact, Up/Down	1	C6	
12	8543023510	Knob Tact, FM/AM	1	C6	
13	8545048710	Knob Tact, C	1	B6	
14	6555004350	Spring Push, Power	3	B6	
15	048553008312	Window Display	3	B6	
16	048535027311	Name Badge, Sherwood	1	C6	
16-1	048535019021	Name Badge	1	C6	Domestic
17	6513003410	Holder LCD	1	B4	
18	6513003610	Holder Lamp	1	C4	
19	046102027021	Chassis Back, Black	1	F4	A
	046102027031	Chassis Back, Black	1	F4	B
	046102027041	Chassis Back, Black	1	F4	C
	046102027051	Chassis Back, Black	1	F4	D
	046102027061	Chassis Back, Black	1	F4	E
	046102027071	Chassis Back, Black	1	F4	F
	046102027011	Chassis Back, Black	1	F4	Domestic
20	4308003910	Cord AC Power, Black	1	E1	A,B
	4308000430	Cord AC Power, Black	1	E1	C,D,F
	4308003610	Cord AC Power, Black	1	E1	E
	6518000810	Cord AC Power, Black	1	E1	Domestic
21	6518000111	Stopper Cord, Black	1	D1	
	6513000310	Stopper Cord, Black	1	D1	Domestic
22	6518001310	Holder Antenna.	1	F2	
23	4408102610	Terminal Ant., 4P	1	E3	Except D
24	7505206220	Heat sink Regulator TR	1	D3	
25	4438101510	RCA Jack, 2P	1	D3	
26	6705004220	Spacer W/PCB	4	D4	
27	6528300210	Fastner W/PCB	2	D3	
28	8535027710	Diffuser LCD	1	B4	
29	2528203810	Lamp, 12V 100mA	2	C4	
30	4628055410	Switch Push	1	B4	
31	4658002020	Switch Tact	17	D5	
32	4355023110	Connector Ass'y 2P, Remocon	1	F2	
33	4408001310	Terminal Ant., 2P	1	E3	D
34	4438301110	Jack DIN	1	F4	D
35	4618001610	Slide Switch	2	E3	B
36	4618000410	Voltage Selector	1	D2	Domestic, B
37	6515000630	Holder Voltage	1	D1	Domestic, B
38	4408104910	Terminal Ground	1	F3	Domestic
• Screws					
S1	8159440083	WSAM 4×8 ZNB	4		
S2	8119230083	#2 BTC 3×8 ZNB	9		
S3	8119226081	#2 PTC 2.6×6 ZNY	9		
S4	8159230081	#2 WPTC 3×8 ZNY	8		
S5	8159440081	WSAM 4×8 ZNY	2		
S6	8159230141	#2 WPTC 3×14 ZNY	4		
S7	8119240061	#2 PTC 4×6 ZNY	1		Domestic
S8	8109230081	#2 BTC 3×8 ZNY	23		

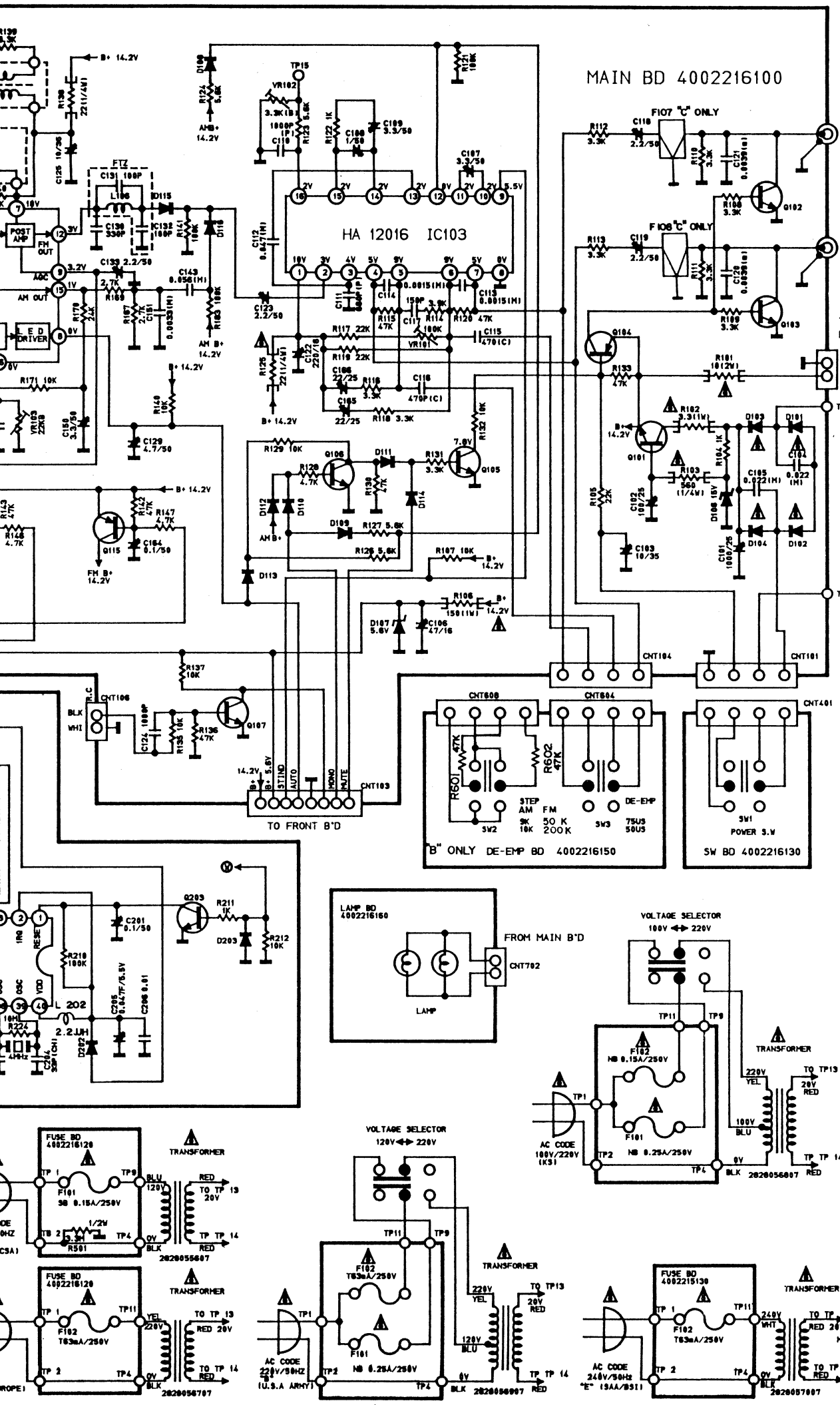
Schematic Diagra

TD2220C(Ⅱ)

	A	B	C	D
1				
2				
3				
4				
5				

D E F G

atic Diagram
2220C(Ⅱ)



FRONT END : "A" "B" "E" /F-3630
"C" /FE 407-060

FTZ
[ ] : FTZ

IC101 : LM 7001
IC102 : LA 1266
IC103 : HA 12016
IC201 : MC 68HC05C4 DWP-501A
IC301 : LC 7582

DZ 8.2V : D201, D301
SW1 : POWER SW
SW2 : FM.AM STEP SW
SW3 : DE-EMPHASIS (75uS, 50uS)
1N4148 : D108, D109, D110, D111, D112, D113
D114, D115, D116
1N4002 : D101, D102, D103, D104
DZ 5.6BM : D107
WZ15 : D106
DZ 8.2V : D210, D301
FET 2SK 168D : Q109
TR KTC 1815Y : Q105, Q106, Q210, Q202, Q203,
Q301, Q302
KTD 1302 : Q102, Q103
KTA 1015Y : Q104, Q114, Q115
LM 9018Y : Q108
KTD 1406 : Q101
KTD 2240BL : Q110
AM MATCHING COIL : L101
AM OSC COIL : L102
FM MUTE LEVEL ADJ : VR103
AM MUTE LEVEL ADJ : VR104
VCO ADJ:VR102
SEPERATION ADJ : VR101
DET A:L105 DET B:L104

※ "A" : R173 → 18K, C133 → 2.2/50
"B", "C", "E", "KS" :
R173 → 33K, C133 → 1/50

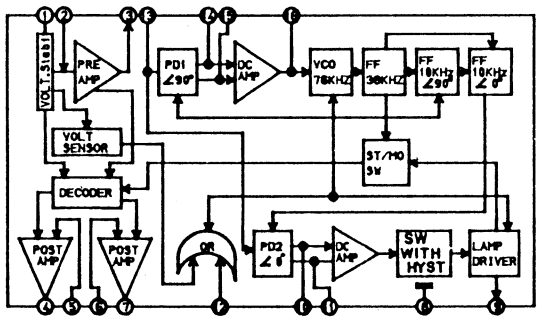
※ "B" : C113 → 0.001(M), C114 → 0.001(M)
"A"
C113 → 0.0015(M), C114 → 0.0015(M)
R207 → 0, R208 → 1, R209 → 1

"KS" R207 → 0, R208 → 0, R209 → 1

"C" "E"
C113 → 0.001(M), C114 → 0.001(M)
R207 → 0, R208 → 0, R209 → 0
R112, R113 → 1.2K
※ "C"
F107, F108 : FILTER 19KHz(FTZ)

Notes
1. Resistance values are indicated in ohms unless otherwise specified (K=1,000, M=1,000,000)
2. Capacitance values are shown in microfarads unless otherwise noted (P=micro-micro farads).

CAUTION :
Safety precautions to be followed during servicing
1) Since those parts marked with ⚠ are critical parts for safety, use the one described in parts list
2) Before returning the appliance to the customer, make appropriate leakage current or resistance measurements to determine that exposed parts are properly insulated from the supply circuit.



HA 12016

(2 BAND)

Schematic Diag

TD2220C( )

FRONT - END
FE 407-G60

IC 102
LA 1266

IC 101
LM 7001

IC 201

IC 301
LC 7582

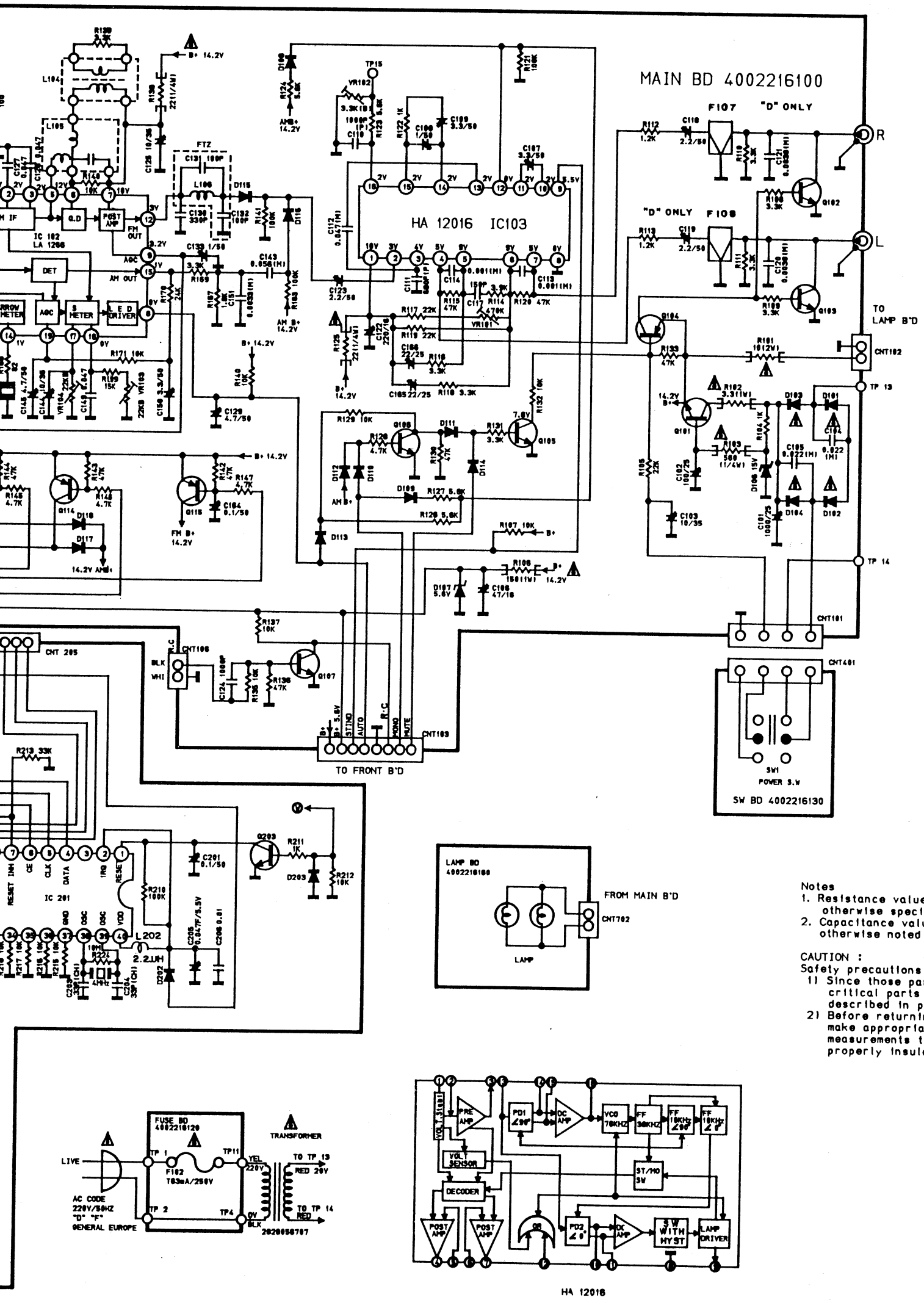
KV1235Z :
VD101
VD102
VD103

	LOW	HIGH
FM	2V	8V
MW	1V	8V
LW	2V	8.5V

FM ANT 75Ω
AM LOOP ANT
TO FRONT B'D
FROM MAIN B'D
LCD B'D 4002216140
FRONT B'D 4002216110
FUSE BD 4002216120
AC CODE 220V/50HZ "D" "F" GENERAL EUROPE

chematic Diagram

TD2220C(I)



FRONT END : "D" /FE 407-060
"F" /F-3630

FTZ : FTZ

IC101 : LM 7001
IC102 : LA 1266
IC103 : HA 12016
IC201 : MC 68HC05C4 DWP-501A
IC301 : LC 7582

DZ 8.2V : D201, D301
SW1 : POWER SW
1N4148 : D108, D109, D110, D111, D112, D113
D114, D115, D116, D117, D118
1N4002 : D101, D102, D103, D104
DZ 5.68M : D107
WZ15 : D106
DZ 8.2V : D210, D301
FET 2SK 1680 : Q109
TR KTC 1815Y : Q105, Q106, Q210, Q202, Q203,
Q301, Q302, Q116, Q117, Q118, Q119
KTD 1302 : Q102, Q103
KTA 1015Y : Q104, Q113, Q114, Q115
LM 9018Y : Q108
KTD 1406 : Q101
KTD 2240BL : Q110
MW MATCHING COIL : L101
LW MATCHING COIL : LL101
MW OSC COIL : L102
LW OSC COIL : LL102
FM MUTE LEVEL ADJ : VR103
MW MUTE LEVEL ADJ : VR104
VCO ADJ:VR102
SEPERATION ADJ : VR101
DET A:L105 DET B:L104

※ "D", "F"
R207→1, R208→0, R209→0
※ "D"
F107,F108 : FILTER 19KHZ.(FTZ)

Notes
1. Resistance values are indicated in ohms unless otherwise specified (K=1,000, M=1,000,000)
2. Capacitance values are shown in microfarads unless otherwise noted (P=micro-micro farads).

CAUTION :
Safety precautions to be followed during servicing
1) Since those parts marked with ⚠ are critical parts for safety, use the one described in parts list
2) Before returning the appliance to the customer, make appropriate leakage current or resistance measurements to determine that exposed parts are properly insulated from the supply circuit.

HA 12016

(3 BAND)